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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Liu, *et al.*
Serial No.: 10/823,159
Filed: April 13, 2004
For: Via Recess In Underlying Conductive Line

Docket No.: TSM03-0454
Art Unit: 2814
Examiner: Marcos D. Pizarro Crespo

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION FILED UNDER 37 C.F.R. § 1.132

Dear Sir:

1. I, Chung-Shi Liu, am an inventor for the inventions of Claims 1-27 of the present application, U.S. Application Serial No. 10/823,159.
2. The depth of the via recess is critical to the reliability and yield of the semiconductor device formed using the inventions of Claims 1-27 of the present application. A critical depth range for the via recess is between about 100 angstroms and about 600 angstroms, to improve performance, reliability, and yield. A more optimized and preferred depth range for the via recess, within the critical depth range, is between about 150 angstroms and about 300 angstroms.
Too much via recess will damage the conductive line. If the conductive line is formed from copper, for example, as is now common practice, a via recess formed too deeply is more likely to induce copper stress migration failure. On the other hand, having the via recess too shallow is more likely to induce current crowding and electron migration (EM) failure. Thus, the depth of the via recess is critical.
3. Forming a via recess in accordance with Claims 1-27 within the critical depth range produces unexpected increases in device performance, reliability, and production yield, which to the best of my knowledge is new. The prior art known to me, and the prior art cited in the office

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action, do not disclose this critical depth range, that this depth range is critical, and the unexpected results of using this new critical depth range.

4. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted,

10/25/05
Date signed

Chung-Shi Liu
Chung-Shi Liu, Inventor